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# Small Quantity Generator's Handbook for Managing RCRA (Resource Conservation and Recovery Act) Wastes Analytical Laboratories

Science Applications International Corp., Bellevue, WA

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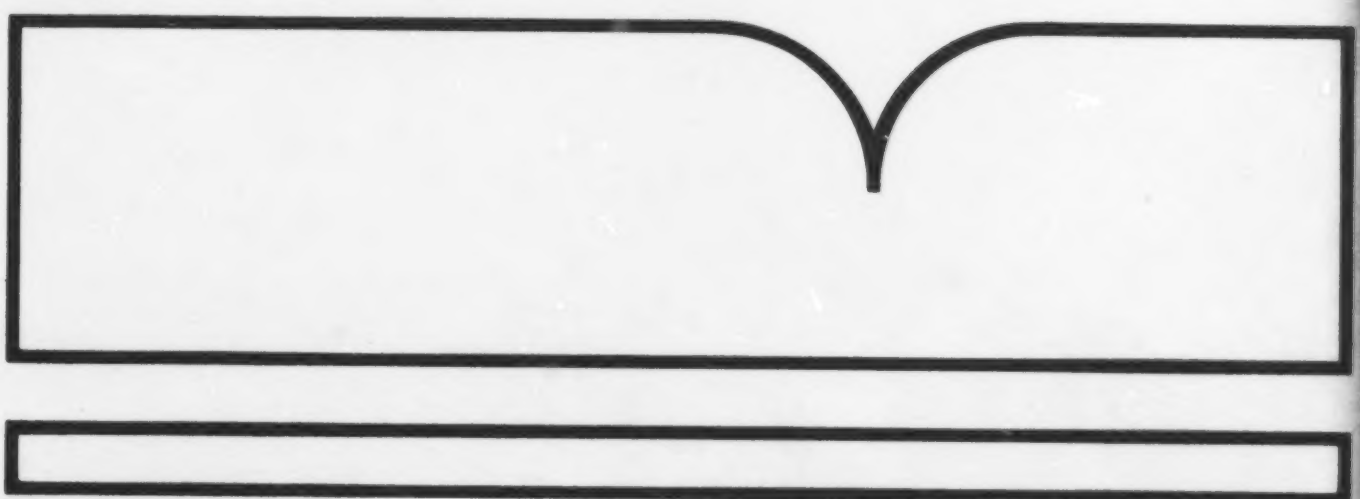

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# THE SMALL QUANTITY GENERATOR'S HANDBOOK FOR MANAGING RCRA WASTES

## - ANALYTICAL LABORATORIES -

STATE OF MONTANA
DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
HELENA, MONTANA

JUNE, 1988

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(Resource Conservation and Recovery Act) (Administrative Rules of Montana)

This RCRA Handbook was developed for analytical and clinical laboratories to provide assistance in complying with pertinent sections of the RCRA requirements. Section 2 summarizes laboratory operations and describes the characteristics of wastes generated and general waste management practices. Section 3 describes how these waste types may be subject to the RCRA and ARM regulations based on how they are managed and on their specific chractertistics. Section 4 discusses RCRA generator requirements, while Section 5 describes waste management strategies for minimizing the amount of hazardous waste generated by laboratories. Appendix A is a listing of acute and toxic hazardous wastes (F, P, and U wastes) used for regulatory purposes. Appendix B provides a summary of RCRA characteristic wastes. Finally, Appendix C contains a list of references and contacts for obtaining more information about hazardous wastes and their regulation.

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## WASTE MANAGEMENT

Contacts:

Waste Exchange Program - This program, sponsored by the Montana Chamber of Commerce, is an informational exchange program designed bring together generators and users of a waste which have a reuse or recycling value. The program is intended to put generators in contact with waste users that can reuse the waste as a feedstock or substitute material in their operations. The Chamber of Commerce publishes a free newletter which lists both waste generators with potentially reusable waste materials, and users who are in the market for a particular reusable waste material.

The state chamber can be contacted at 110 Neill Avenue, Helena, Montana, 59601. The telephone number is (406) 442-2405.

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## - ANALYTICAL LABORATORIES -

Prepared for:

State of Montana
Department of Health and Environmental Sciences
Helena, Montana

Prepared by:

Science Applications International Corporation
Bellevue, Washington

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# 1.0 INTRODUCTION

In 1976, Congress, recognizing that the problem of solid and hazardous waste disposal had become a national concern, passed the Resource Conservation and Recovery Act (RCRA). This legislation was designed to address two major problems:

- The dangers to human health and the environment posed by improper waste disposal
- The conservation of valuable material and energy resources

Subtitle C of RCRA establishes a "cradle-to-grave" hazardous waste management system, which is administered by the U.S. Environmental Protection Agency (EPA). This system provides for managing, tracking, and regulating hazardous wastes at each step of the way from generation to final disposal. The regulations developed by EPA apply to those who generate, transport, treat, store, or dispose hazardous wastes.

This RCRA Handbook was developed for analytical and clinical laboratories to provide assistance in complying with pertinent sections of the RCRA requirements. The manual also provides waste management strategies for minimizing waste quantities. Waste minimization has several economic advantages including reducing the costs required to comply with the RCRA requirements and reducing product requirements if waste recycling or reuse is practiced.

The information on laboratories in this document was compiled through site visits to such businesses across the State of Montana. These site visits were conducted to identify the types and quantities of both hazardous and non-hazardous wastes typically generated, and to observe current waste management practices. Following these visits, a review of the RCRA regulations and the Administrative Rules of Montana (ARM) was performed to identify specific regulations applicable to laboratory wastes.

Section 2.0 of this manual summarizes laboratory operations and describes the characteristics of wastes generated and general waste management practices. Section 3.0 describes how these waste types may be subject to the RCRA and ARM regulations based on how they are managed and on their specific

characteristics. Section 4.0 discusses the RCRA generator requirements, while Section 5.0 describes waste management strategies for minimizing the amount of hazardous waste generated by laboratories. Appendix A is a listing of acute and toxic hazardous wastes (F, P, and U wastes) used for regulatory purposes. Appendix B provides a summary of RCRA Characteristic Wastes. Finally, Appendix C contains a list of references and contacts for obtaining more information about hazardous wastes and their regulation.

## 2.0 WASTE STREAM CHARACTERIZATION

This section of the manual discusses the operations of laboratories and the generated waste streams. Laboratories may be categorized as analytical laboratories, such as environmental, testing, research, and educational laboratories; and clinical laboratories, comprised primarily of medical laboratories. These facilities operate using similar procedures, but there are some differences in the types of waste material generated.

### 2.1 SUMMARY OF OPERATIONS

#### 2.1.1 Research, Environmental, and Materials Testing Laboratories

In the first step of operation for analytical labs, a sample is received for analysis. Sample matrices may be aqueous or solid, and include environmental samples such as soil or water, waste materials, food, or a sample collection matrix such as filter paper or activated charcoal. The samples received by the laboratory are usually logged in upon receipt for internal tracking purposes. Once a suitable analytical protocol has been decided upon, the required reagents are collected from an existing inventory or ordered if necessary. A wide variety of both organic and inorganic reagents may be used by these laboratories. The sample is then analyzed and the results are calculated. The final step typically involves disposing of the sample and spent reagents. In some cases, samples may be retained for an indeterminate length of time to accommodate a legal requirement.

#### 2.2.2 University and Secondary School Laboratories

Educational labs, such as those operated by secondary schools and universities, operate somewhat differently than the analytical labs discussed above. Typically, an educational course must cover a set amount of material and certain laboratory experiments are performed to supplement course material. The reagents for the experiments are usually placed in the lab on an "as needed" basis by the instructor and lab assistants. Typically, these reagents are then removed from the lab once the class has performed a particular experiment. These laboratories use a wide variety of inorganic and organic reagents, with universities often having a much larger inventory than secondary schools. Universities may have difficulty controlling

reagent inventory and the disposal of waste materials due to large number, variety, and location of facilities. Secondary school labs may have difficulty controlling inventories as well. Turnover of personnel attributes to excessive accumulation of reagents, which many secondary schools may find cost-prohibitive to dispose.

### 2.1.3 Medical Laboratories

Medical laboratories provide a wide variety of services for the health care industry. They perform tissue typing and analysis of various bodily fluids. Samples may be aqueous or solid. A wide variety of reagents, in small quantities, are used in sample analysis; these reagents may be both organic and inorganic chemicals. In most cases, medical laboratories do not have as wide a variety of reagents as analytical laboratories, but they may have specialty chemicals not found in many analytical laboratories. Of particular significance may be radioactive tracers in medical laboratories, not commonly found in most analytical laboratories.

## 2.2 SUMMARY OF WASTE STREAMS

Due to the wide variety of reagents, solvents, and disposable equipment used by laboratories, a detailed description of the wastes generated will not be attempted here. Instead, a broader overview of waste types will be discussed. These waste types will be segregated into general categories for the purpose of discussing waste characteristics and waste management strategies, presented later in this manual.

### 2.2.1 Wastewater

Wastewaters are the largest volume waste generated by laboratories. These wastewaters are typically generated from washing and rinsing operations, as cooling water, and from some chemical reactions. The most common disposal practice for this wastewater is by discharge to a sanitary sewer where it is collected and treated at a municipal sanitary wastewater treatment facility. Some laboratories may have an on-site treatment or pretreatment facility for wastewater prior to discharge to a sanitary sewer or surface water. In areas not serviced by a municipal sanitary sewer system, discharge may be to an on site septic system.

### 2.2.2 Waste Reagents

The term reagent covers a wide variety of inorganic and organic chemicals. Most laboratories have a variety of reagents in stock and at least one stockroom where the reagents are kept. Both analytical and clinical labs typically use very small quantities of reagents in analyses. Most of the analytical work involves quantities in the micro(gram, liter) to milli(gram, liter) concentration. This is true of most experiments performed by the secondary school and university labs as well.

The waste reagents generated by laboratories are primarily from the analytical tests and reagents whose shelf life has expired. The vast majority of waste reagents generated from aqueous tests are dumped down the drain to the sewer system. Most reagents whose shelf life has expired are either rendered inert and disposed of in a landfill, or packed in labpacks and disposed of as a hazardous waste.

### 2.2.3 Spent Solvents

Solvents used in laboratories have a variety of applications. Both halogenated and non-halogenated solvents (e.g., methylene chloride and acetone, respectively) are commonly used. Spent solvents are typically washed down sink drains with rinse water during cleaning operations. Some laboratories containerize spent solvents and dispose of the waste off-site at a treatment, storage, or disposal facility (TSDF).

### 2.2.4 Waste Samples

Materials testing and environmental labs generate waste samples from excess samples left in the sample container, or from solid samples which become wastes following testing. Waste samples may be generated from essentially any medium that is sampled, including soil, water, waste media, and sample collection matrices (such as charcoal for air samples).

### 2.2.5 Biohazardous Waste Material

Biohazardous material is a category of waste produced primarily by clinical and medical research laboratories. These wastes include tissue from tissue typing; lab equipment used to handle infectious waste, such as culture

tubes, petri dishes, and pipettes; and any material used to handle blood. This material is typically disposed into biohazard bags that are placed around the lab at convenient locations; this material is collected daily and incinerated or autoclaved. Incineration is most commonly used by clinical labs associated with hospitals. Biohazardous waste that cannot be incinerated is placed in an autoclave and sterilized. After sterilization, the material is placed in the dumpster, and eventually landfilled. Biohazardous materials are not regulated as part of the RCRA program, and are not considered further in this manual.

### 2.2.5 Radioactive Waste

Radioactive waste is generated in very small quantities. Scintillation vials are used in a few laboratories. However, the types of laboratories discussed in this manual do very little work with radioactive material. The concentration of the radioactive materials is typically very low. Radioactive laboratory waste materials are not regulated under RCRA; the appropriate Federal and state regulations should be followed for disposal of this material. Radioactive wastes are therefore not considered further in this manual.

# 3.0 HAZARDOUS WASTE REGULATIONS

## 3.1 FEDERAL HAZARDOUS WASTE REGULATIONS

The Federal regulations governing the management of hazardous waste are specified under the Resource Conservation and Recovery Act (RCRA). The objectives of RCRA are to improve the management of solid wastes, which includes hazardous wastes, to protect the environment and human health, and to conserve valuable materials and energy resources. These RCRA regulations are specified in the Code of Federal Regulations (CFR), Title 40, Parts 260 through 272. The Environmental Protection Agency has the authority to administer the RCRA program.

## 3.2 STATE HAZARDOUS WASTE REGULATIONS

In the State of Montana, the Department of Health and Environmental Science (DHES) has been given the authority from EPA to develop and administer a hazardous waste management program. EPA requires that the development and administration of this state program is consistent with the federal standards set forth in the RCRA regulations. The state has developed hazardous waste management regulations under the Montana Hazardous Waste Act of October 1, 1985, which are specified in the Administrative Rules of Montana, Title 16, Chapter 44. This state program incorporates the Federal RCRA standards and includes additional requirements that were developed for the classification, generation, storage, treatment, and disposal of hazardous wastes.

## 3.3 HAZARDOUS WASTE CLASSIFICATION

RCRA and the Administrative Rules of Montana (ARM) have established certain standards and criteria based on waste characteristics and management practices to determine whether or not a waste is considered a hazardous waste. If a waste is determined to be hazardous, specific regulations under RCRA and ARM apply to the management of that waste including storage, treatment, and disposal of the waste.

There are two ways a waste may be brought into the hazardous waste regulatory system: listing and identification through characteristics.

These classifications are summarized below:

- Listed Wastes - A waste may be considered hazardous if it appears on any one of four lists of hazardous wastes contained in the RCRA regulations. These wastes have been listed because they exhibit one of the characteristics described below or contain any number of toxic constituents that have been shown to be harmful to the health and the environment. The RCRA regulations list over 400 hazardous wastes, including wastes derived from non-specific sources (F Wastes), manufacturing processes (K Wastes), and discarded chemical products (P and U Wastes). These lists can be found in the CFR, Title 40, Part 261, Supart D. The F, P, and U wastes are listed in Appendix A.

- Characteristic Wastes - Even though a waste does not appear on one of the above hazardous wastes lists, it may be considered a hazardous waste if it exhibits certain characteristics. A waste may be considered hazardous if it exhibits any one of the following characteristics: ignitable, corrosive, reactive, or EP toxic. These specific characteristics and criteria for identifying the RCRA characteristic wastes are described in detail in Appendix B. These characteristics are referenced in the CFR, Title 40, Part 261, Subpart C.

### 3.3.2 Exemptions from RCRA and ARM Regulations

Certain waste management practices may be exempt from RCRA and ARM regulations; these are discussed in more detail below. In all cases, the business should consult DHES and local authorities to determine whether the exemptions are applicable to the specific practice carried out at the facility.

Municipal Sanitary Sewer Discharges - Laboratory wastewater that is discharged to the sanitary sewer system where it is collected and treated in a municipal wastewater treatment facility is not subject to the RCRA and ARM hazardous waste regulations. These wastewaters, even though they may contain RCRA-listed wastes or exhibit RCRA characteristics, are excluded from RCRA and ARM reguations based on the domestic sewage exemption. For this exemption to apply, the laboratory wastewater must be discharged along with domestic sewage to a municipal wastewater treatment facility. If laboratory wastewaters are not discharged along with domestic sewage, then the domestic sewage exemption does not apply and the wastewaters may be subject to the RCRA and ARM regulations.

Laboratory wastewaters discharged to the sanitary sewer system may also be subject to local restrictions or limitations. Municipalities or city governments often establish restrictions or limitations on specific parameters in the wastewater to protect the wastewater treatment facility. Toxic parameters present in the laboratory wastewaters may interfere with or disrupt the operation of the wastewater treatment facility. These discharge restrictions or limitations are often imposed through local sewer use ordinances, administrative code, or permit system. Businesses intending to discharge process wastewaters to the sanitary sewer system should check with their local government to determine what restrictions or limitations may apply and if a discharge permit is required.

Surface Water Discharges - Process wastewaters discharged to surface water under NPDES permit, such as a direct discharge to a lake or a stream, or to a storm sewer, are not subject to RCRA or ARM regulation. These discharges are subject to the Federal Clean Water Act and ARM 304(1)(g). These regulations place restrictions and limitations on specific wastewater parameters that can be discharged. Businesses discharging to a surface water are required to obtain a discharge permit (NPDES permit) from the Montana DHES Water Quality Bureau. To meet the discharge limitations, the process wastewaters must generally be extensively treated on-site prior to discharge. Wastewaters containing hazardous wastes cannot be discharged to surface waters.

On-site Treatment or Pretreatment - Laboratories that discharge their wastewater containing RCRA toxic wastes (U wastes) listed in 40 CFR 261, Subpart D, to an ON-SITE treatment or pretreatment facility are exempt from RCRA regulation as follows:

- The waste mixture is not considered hazardous if the annualized average flow of laboratory wastewater does not exceed one percent of total wastewater flow into the headworks of the facility's wastewater treatment or pretreatment system, or provided the wastes combined annualized average concentration does not exceed one part per million in the headworks of the facility's wastewater treatment or pre-treatment facility. The discharges from treatment or pretreatment facility must be subject to the pretreatment standards (Section 307 of Clean Water Act) or to NPDES permit (Section 402 of the Clean Water Act). Toxic wastes that can be

demonstrated not to be discharged to wastewater are not to be included in this calculation. [40 CFR 261.3(a)(2)(iv)(E)]

Any mixture of wastes and wastewater that exhibit hazardous waste characteristics as described in Section 3.3.1 is considered a hazardous waste and must be treated within the guidelines described in Section 4.3 of this manual.

In addition, wastewater containing spent solvents (F Wastes) which are discharged to an ON-SITE treatment or pre-treatment facility may be exempt from RCRA or ARM regulation. The following mixtures are exempt if:

- The total weekly usage of one or more of the following spent solvents-carbon tetrachloride, tetrachloroethylene, trichloroethylene - divided by the average weekly flow of wastewater into the headworks of the facility's wastewater treatment or pretreatment system does not exceed 1 part per million (do not include amounts of solvents that can be demonstrated not to be discharged to wastewater) [40 CFR 261.3(a)(2)(iv)(A)]; or

- The maximum total weekly usage of one or more of the following spent solvents - methylene chloride, 1,1,1-trichloroethane, chlorobenzene, o-dichlorobenzene, cresols, cresylic acid, nitrobenzene, toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, spent chlorofluorocarbon solvents - divided by the average weekly flow of wastewater into the headworks of the facility's wastewater treatment of pretreatment system does not exceed 25 parts per million (do not include the amounts of solvents that can be demonstrated not to be discharged to wastewater). [40 CFR 261.3(a)(2)(iv)(B)]

Any waste mixture that exhibits hazardous characteristics as described in Section 3.3.1 is considered hazardous and must be treated as specified in Section 4.3 of this manual.

## 3.4 APPLICABILITY OF FEDERAL AND STATE HAZARDOUS WASTE REGULATIONS TO ANALYTICAL AND CLINICAL LABORATORIES

Wastes generated from laboratory operations may be subject to RCRA and ARM hazardous waste regulations, depending upon how they are managed and on their specific characteristics. The determination of applicable hazardous waste regulations to laboratory wastes involves determining the types of wastes generated, whether they are hazardous, and how each waste type is

managed. Section 2.0 of this manual provided a summary of the types of wastes generated from laboratory operations, including spent aqueous chemistry solutions, waste reagents, and spent solvents, and how these wastes are typically managed. Disposal practices included sanitary sewer discharge, onsite treatment or disposal, and off-site disposal.

The following discussion describes how some of these wastes may be subject to the RCRA and ARM regulations based on their listing or characteristics, and waste management practices.

### 3.4.1 Expired or Spent Reagents

Expired and spent reagents may consist of an extremely wide range of chemicals. Discarded commercial chemicals are listed in Appendix A, Tables A-1 and A-2; these are the P and U listed wastes. In order to determine whether a waste reagent is hazardous, its generic and trade name should be looked up in one of these two tables. If the name of the chemical is in one of these lists, it is considered hazardous and must be disposed as a hazardous waste, and handled as explained in Section 4.0. Some reagents may not be a RCRA-listed waste, but may exhibit a RCRA characteristic, such as ignitability (i.e., some solvents), reactivity (i.e., cyanides), corrosivity (i.e., acids and caustics) or EP toxicity (i.e., reagents containing heavy metals or pesticides).

### 3.4.2 Spent Solvents

Many spent solvents are classified as hazardous wastes by RCRA. Many of the spent solvents are RCRA listed F-wastes, as shown in Table 3-1. Other spent solvents exhibit the RCRA characteristic of ignitability (D001). Spent solvents which are not listed as an F-waste, and do not exhibit a RCRA characteristic, may be managed as non-hazardous waste. Containers which hold unused solvents should be managed as waste reagents (Section 3.4.2).

### 3.4.3 Samples

Samples as defined by RCRA are solid waste, water, soil, or air, which is collected for the sole purpose of testing to determine its characteristics

Table 3-1

COMMON SOLVENTS AND CLASSIFICATIONS

| EPA Hazardous Waste Number | Active Chemical | Hazard Code |
|---|---|---|
| F001 (halogenated solvents used in degreasing) | Tetrachloroethylene<br>Trichloroethylene<br>Methylene Chloride<br>1,1,1-Trichloroethane<br>Carbon Tetrachloride<br>Chlorinated Fluorocarbons | Toxic |
| F002 (halogenated solvents) | Tetrachloroethylene<br>Methylene chloride<br>Trichloroethylene<br>1,1,1-trichloroethane<br>Chlorobenzene | Toxic |
| F003 (non-halogenated solvents) | Xylene<br>Acetone<br>Ethyl Acetate<br>Ethyl Benzene<br>Ethyl Ether<br>Methyl Isobutyl Ketone<br>n-Butyl Alcohol<br>Cyclohexane<br>Methanol | Ignitable |
| F004 (non-halogenated solvents) | Cresols<br>Cresylic acid<br>Nitrobenzene | Toxic |
| F005 (non-halogenated solvents) | Toluene<br>Methyl Ethyl Ketone<br>Carbon Disulfide<br>Isobutanol<br>Pyridine<br>Benzene<br>2-Ethoxyethanol<br>2-Nitropropane | Ignitable and Toxic |
| D001 (non-halogenated solvents) | Stoddard Solvent<br>Petroleum Distillates<br>Naptha<br>Isopropanol<br>Kerosene<br>Ethanol | Ignitable |

Source: 40 CFR 261, Subpart D.

or composition. Samples held at a laboratory are exempt from regulation if they meet one of following three conditions [40 CFR 261.4(d)]:

- The sample is being stored before testing; or
- The sample is being stored after testing but before it is returned to the sample collector; or
- The sample is being temporarily stored after testing for a specific purpose (for example, until conclusion of a court case or enforcement action where further testing may be necessary).

This exemption does not apply if the laboratory determines that the sample material is hazardous, and the laboratory is no longer meeting any one of the three conditions above. For example, the exemption does not apply to unused hazardous samples which were not required for analysis and are not being returned to the sample collector, or which do not require further storage. These wastes must be treated as hazardous and handled as discussed in Section 4.0.

# 4.0 HAZARDOUS WASTE GENERATOR REQUIREMENTS

## 4.1 BACKGROUND

The Environmental Protection Agency (EPA) and the Montana Department of Health and Environmental Science (DHES) classify generators of hazardous waste in three categories according to the amount of waste they generate. This classification was done in response to public attention to the fact the inappropriate management of even small quantities of hazardous waste can result in health or environmental problems. Depending on which generator category applies to a specific business, certain precautions or actions may be required in the management of hazardous wastes.

## 4.2 CATEGORIES OF GENERATORS

Businesses that generate 1,000 kilograms or more (2,200 pounds) per month of hazardous waste (or one kilogram per month of acute hazardous waste) must abide by all of the requirements of the law, and are not eligible for any exemptions. These are classified as large hazardous waste generators. Requirements for this category are not addressed in this manual.

Businesses generating between 100 kilograms and 1,000 kilograms (220 pounds to 2,200 pounds) per month of hazardous waste have been designated as SMALL GENERATORS and are allowed some special provisions. Finally, businesses that generate less than 100 kilograms (220 pounds) per month of hazardous waste are designated as CONDITIONALLY EXEMPT GENERATORS.

## 4.3 REQUIREMENTS FOR ALL GENERATORS

Each of the requirements that are described below apply to all generators, regardless of quantity. These are summaries of the Federal regulations and the State of Montana's regulations. The Federal regulations for hazardous waste generators are found in the Code of Federal Regulations, Title 40, Parts 261 and 262 (40 CFR 261 and 262) and are administered by EPA. The State of Montana's rules for hazardous waste generators are found in the Administrative Rules of Montana, Title 16, Chapter 44, and administered by DHES.

It is important to note that the Federal laws apply nationwide. In some cases, requirements that have been added to the original Federal laws have not yet been adopted by the State of Montana. Even if the State has not yet adopted certain requirements from the Federal law, businesses are still required to abide by these Federal requirements. In addition, the State of Montana may have developed special requirements to address special problems within the state.

- All generators must determine which of the wastes they generate are hazardous. Sections 2.0 and 3.0 of this guidance manual contains descriptions of the hazardous wastes generated in a specific type of business. [40 CFR 262.11, ARM 16.44.402]

- All generators must segregate listed (F, K, P and U) hazardous wastes from non-hazardous wastes. Listed hazardous wastes are materials that have been specifically catalogued and are always considered hazardous. MIXING THESE WASTES WITH NON-HAZARDOUS WASTE WILL MAKE THE ENTIRE VOLUME A HAZARDOUS WASTE. Sections 2.0 and 3.0 of this guidance manual identified listed hazardous wastes that may be generated in your business.

- Under certain circumstances, generators may mix characteristic hazardous wastes and non-hazardous wastes if they are compatible (not reactive or explosive, etc.). The mixture is considered non-hazardous only if it no longer meets the characteristics of a hazardous waste. IF THE MIXTURE IS A WASTE EXHIBITING A HAZARDOUS CHARACTERISTIC, THE ENTIRE MIXTURE BECOMES A HAZARDOUS WASTE, AND THE SMALL GENERATOR MAY BECOME A LARGE GENERATOR AS A RESULT. Section 3.0 and Appendix B of this guidance manual identify the characteristics of hazardous waste that may apply to your business.

- In the event of a hazardous waste spill, all generators must treat spilled hazardous wastes, clean-up residues and containers as hazardous wastes.

- All generators must use containers that are compatible with the hazardous waste they are to contain. Containers should be sealed and free from leakage.

- All generators of hazardous waste must ensure their wastes are delivered to an off-site facility that is authorized by EPA or the state in which the receiving facility is located to receive municipal, industrial, or hazardous waste. The type of facility depends on the category of the generator.

- All generators must ensure that off-site shipments of hazardous waste are labeled, marked, and placarded according the U.S. Department of Transportation (DOT) requirements. This includes a U.S. DOT waste description, shipping name, hazard class, and

identification number. Any questions about DOT shipping requirements can be referred to the Montana State Department of Transportation. [40 CFR 262.30 to 262.33]

- A Hazardous Waste Manifest is required when shipping hazardous wastes off-site. The standard form is the U.S. EPA manifest form 8700-22, which is processed by DHES. [ARM 16.44.405]

## 4.4 REQUIREMENTS FOR CONDITIONALLY EXEMPT GENERATORS

A business qualifies as a Conditionally Exempt Generator if no more than 100 kilograms (220 pounds) per month of hazardous waste and no more than 1 kilogram (2.2 pounds) per month of acutely hazardous waste are generated. Acutely hazardous wastes are listed in Table A-1 of Appendix A. No more than 1,000 kilograms (2,200 pounds) of hazardous waste can be accumulated on-site or on your property. There is no time limit for this accumulation, as long as the 1,000 kilogram storage limit is not exceeded.

As a rule of thumb, a 55-gallon drum of hazardous waste is about 200 kilograms (440 pounds). This means that the business must generate less than one-half of a 55-gallon drum of hazardous waste per month or accumulate no more than five 55-gallon drums at any one time.

As long as the above two conditions are maintained, a business falls into a category called "conditionally exempt". The business must still meet all of the requirements presented in Section 4.3 of this manual, but it is conditionally exempt from other requirements for generators of hazardous wastes.

Examples of how a business can lose conditionally exempt status are:

- The business generates less than 100 kilograms per month eleven months out of the year, and more than 100 kilograms in the twelfth month.
- The amount of hazardous waste accumulated by a business exceeds 1,000 kilograms.

If hazardous waste management practices result in a business losing its conditionally exempt status, all requirements for Small Generators must be met. These are listed in Section 4.5 of this manual.

As long as the business meets the requirements of this section, hazardous waste may be disposed at a hazardous waste facility, or a licensed Class II sanitary landfill or other facility approved by the State of Montana for industrial or municipal wastes on the condition that the operating authority of the landfill accepts the waste.

## 4.5 REQUIREMENTS FOR SMALL GENERATORS

Small generators are businesses generating between 100 and 1,000 kilograms (220 to 2,200 pounds) of hazardous waste per month. If a business falls in this category, it also may not generate more than 1 kilogram (2.2 pounds) per month of acutely hazardous waste (see Appendix A, Table A-1), and may not accumulate on-site more than 6,000 kilograms of hazardous waste. Businesses in this category must meet the following requirements:

### Identification

- Small generators must have an EPA identification number. This twelve-digit number is part of a national data base to track hazardous waste activities for generators, transporters, disposal facilities, etc. In order to obtain an EPA identification number, contact the State of Montana Department of Health and Environmental Sciences and request a copy of EPA form 8700-12 "Notification of Hazardous Waste Activity". [40 CFR 262.12, ARM 16.44.403]

### Accumulation Time Limit

- Storage of hazardous waste on the generator's property must not exceed 180 days, except if the waste must be transported greater than 200 miles, in which case the waste may be stored for up to 270 days. Hazardous waste may only be transported to authorized treatment, storage, or disposal facilities (TSDF). DHES can assist businesses with locating an authorized facility. This provision is designed to allow Small Generators to accumulate enough waste to justify making a shipment. [40 CFR 262.34 (e-f), ARM 16.44.415]

- Containers or drums must be labeled and dated on the first day that any hazardous waste is placed in them. From this date, each individual container may hold waste for a maximum of 180 days (or 270 days, depending on shipping distance) before it must be shipped to a TSDF. Wastes may not be transferred from one container to another to extend the allowable accumulation time. [40 CFR 262.34, ARM 16.44.415]

- Small Generators who reach the 6,000 kilogram (13,200 pounds) accumulation limit for total hazardous wastes on site must ship the waste to a TSDF in accordance with the rules in this section.

On-site Treatment

- Under certain circumstances, Small Generators may treat hazardous wastes on their property without a special permit only if the treatment takes place within the 180 day (or 270 day) time limit for storage and only if all container and tank storage requirements presented below are followed, and all necessary precautions taken to prevent spills or accidents. On-site treatment should be discussed with Montana DHES prior to commencement of operations to ensure that all applicable regulations have been followed.

On-site Disposal

- No Small Generator may dispose of hazardous wastes on their property without a Disposal Permit issued by EPA or DHES.

Shipment

- Small Generators must ship wastes to a hazardous waste TSDF. Wastes must be shipped using a manifest, and all manifest and waste analysis records must be maintained for at least three years. Care should be taken in selecting a waste hauler and a TSDF since the generator is still responsible for the proper management of the waste, even after it leaves his property. The generator should ensure that all hazardous waste haulers and TSDFs have EPA ID numbers. [40 CFR 262.40, 262.44, ARM 16.44.416]

Container Storage

If hazardous wastes are stored in containers (such as drums) the generator must:

- Clearly label each container with the words "Hazardous Waste" and the date on which waste storage begins in that container. Labels can be obtained from DHES.

- Make sure that hazardous waste is not stored in a container that will be corroded, ruptured, or damaged in any way by that waste. [40 CFR 265.172]

- Containers should be closed except when being filled or emptied. [40 CFR 265.173]

- Inspect containers weekly. Keep containers in good shape and replace any that are leaking. [40 CFR 265.174]

- Transfer hazardous waste from leaking containers to different containers. Label the new containers with the start date from the original container. [40 CFR 265.171]

- Never store wastes in the same container if they are noncompatible (reactive, explosive, etc.). [40 CFR 265.177]

- Containers of ignitable or reactive wastes must be stored as far as possible from the facility property line to ensure a buffer zone.

Tank Storage

If hazardous wastes are stored in tanks the generator must: [40 CFR 265.201]

- Inspect tanks weekly and ensure that they are not leaking. Inspect monitoring or gauging systems each operating day.

- Make sure that hazardous waste is not stored in a tank that will be corroded, ruptured, or damaged in any way by that waste.

- Keep the tank covered or maintain at least two feet of freeboard (space at the top of the tank) in uncovered tanks.

- Provide a means to cut off or divert flow of waste into the tank in the event of a problem.

- Abide by National Fire Protection Association requirements for tanks containing ignitable or reactive wastes. These requirements specify the distances needed to establish safe buffer zones for various liquids based on combustible and flammable characteristics. The local fire department or DHES can assist with this.

Emergency Response

- At least one employee must be on hand or on call at all times in case of an emergency, and to be responsible for coordinating emergency response measures. This person is the emergency coordinator and he or his designee must respond to any emergencies.

- Small Generators must post the following information next to the telephone:

  - Name and telephone number of the emergency coordinator

  - Location of the fire extinguishers, spill control equipment, and fire alarm

  - Telephone number of the fire department, unless the facility is equipped with a direct alarm

- Small Generators must ensure that all employees are thoroughly familiar with the waste handling and emergency procedures relevant to their responsibilities.

- Emergencies that require a response include the following:

  - In the event of a fire, call the fire department or attempt extinguish the fire using a fire extinguisher

  - In the event of a spill, contain the flow of hazardous waste to the extent possible, and as soon as is practicable, clean up the hazardous waste and any contaminated materials or soil

- In the event of a fire, explosion, or other release that could threaten human health outside the facility or when the generator has knowledge that a spill has reached surface waters, the generator must immediately notify both the Montana DHES Hazardous Materials Spills Program (1-406-444-6911) and the National Response Center (1-800-424-8802). The report must include the following:

  - The generator's name, address, and EPA identification number

  - Date, time, and type of accident (e.g., spill, fire)

  - Quantity and type of hazardous waste involved in the incident

  - Extent of injuries, if any

  - Estimated quantity and disposition of recovered materials, if any

# 5.0 WASTE MANAGEMENT PLANS

This section of the manual provides waste management strategies applicable to analytical and clinical laboratories. Waste management strategies are focused on minimizing the amount of hazardous wastes that could be generated from these operations. There are several advantages of hazardous waste minimization including:

- Reducing the high costs associated with the management and disposal of hazardous waste
- Reducing the liability risks associated with the management and disposal of hazardous wastes
- Reducing the problems arising from restrictions on land disposal of certain hazardous wastes
- Minimizing the time and resources required to comply with the hazardous waste management regulations

Waste minimization practices can include product substitution, process modifications, waste treatment, good housekeeping practices, and recycling and re-use. The selection of a particular waste minimization practice is based upon the industry or business operations, types of wastes generated, and their individual needs and problems.

## 5.1 INVENTORY CONTROL

Of particular importance in minimizing the amount of hazardous waste to be handled in the laboratory is the control of inventory and purchasing of chemicals. In an analytical laboratory, a single person or team should be responsible for purchasing and tracking reagents on a facility-wide basis. This will ensure that excessive amounts of reagents are not purchased for different laboratory departments, and that reagent required by one department may be shared by other departments on an as needed basis. The most effective inventory control may be to establish a centralized storage area for reagents, with a sign-out policy for reagents removed from the storage area. The sign-out sheets may also be used to analyze trends in the quantities of reagents used and therefore, the amounts needed for purchase in the future.

## 5.2 WASTE SEGREGATION

Hazardous and non-hazardous wastes should be segregated and disposed separately where practical. Spent reagents which are not hazardous and waste sample materials which are not hazardous should be disposed at a licensed Class II sanitary landfill or, where applicable, discharged to the sanitary sewer. Spent materials of all types which are hazardous wastes should be stored in a separate storage area from non-hazardous waste, and should be treated as hazardous wastes when disposed.

## 5.3 RECYCLING

Some types of hazardous wastes generated in the laboratory are amenable to on-site or off-site recycling. Spent solvents are examples of hazardous wastes that can be recycled. These waste materials may be reclaimed on-site in a batch distillation operation, or may be collected and sent off-site for recycling by a registered recycling facility. If recycled on-site, reclaimed solvents may be re-used, with the remaining still bottoms being the only hazardous waste. This will result in a significant waste volume reduction, the amount depending on the types and quantities of solvents used in the laboratory. Whether recycling is to be conducted on-site or off-site, it is important to remember to keep different solvents segregated, as the efficiency of the distillation operation may be affected be incompatible solvent mixtures.

## 5.4 OFFSITE DISPOSAL

The RCRA regulations (40 CFR 264.316) allow for small quantities of liquid hazardous wastes (five gallons or less) to be disposed in hazardous waste landfills (TSDFs) in LABPACKS. The requirements for this type of disposal are outlined below:

(a) Hazardous waste must be packaged in non-leaking inside containers. The inside containers must be of a design and constructed of a material that will not react dangerously with, be decomposed by, or be ignited by the contained waste. Inside containers must be tightly and securely sealed. The inside containers must be of the size and type specified in the Department of Transportation (DOT) hazardous materials regulations (49 CFR Parts 173, 178, and 179), if those regulations specify a particular inside container for the waste.

(b) The inside container must be overpacked in an open head DOT-specification metal shipping container of no more than 110 gallon capacity and surrounded by, at a minimum, a sufficient quantity of absorbent material to completely absorb all of the liquid contents of the inside containers. The metal outer container must be full after packing with inside containers and absorbent material.

(c) The absorbent material used must not be capable of reacting dangerously with, being decomposed by, or being ignited by the contents of the inside containers.

(d) Incompatible wastes must not be placed in the same outside container.

(e) Reactive wastes, other cyanide or sulfide-bearing waste, must be treated or rendered non-reactive prior to packaging. Cyanide- and sulfide-bearing wastes may be packaged in accordance with paragraphs (a) through (d) without first being treated or rendered non-reactive.

(f) The following wastes are prohibited from being disposed in this manner, without additional special requirements for the landfill and for the method of disposal (40 CFR 264.317): F020, F021, F022, F023, F026 and F027. See Appendix A, Table A-1 for a detailed listing of these acute hazardous wastes.

Liquid hazardous wastes which cannot be disposed in this manner should be stored for off-site disposal or treatment by a hazardous waste TSDF.

## 5.5 SEPTIC SYSTEM DISCHARGES

In areas not serviced by a municipal sanitary sewer system, septic system discharges of wastewater are a possible wastewater management alternative for laboratory wastes. These discharges, however, depend upon DHES approval. The generator must determine if his waste is a regulated hazardous waste, and if so, then discharge to a septic system discharges are prohibited. Regulatory approval of these discharges will be based on wastewater characteristics, septic system design, and site-specific characteristics.

For this disposal method to be acceptable, the DHES requires that wastewater segregation is practiced. The non-hazardous process wastewaters may be discharged to the septic system. The hazardous process wastewaters must be

collected and disposed in a manner consistent with the hazardous waste generator requirements as outlined in Section 4.0, such as a licensed offsite hazardous waste disposal facility.

Table A-1

LIST OF ACUTE HAZARDOUS WASTES
Source: 40 CFR 261.33(e)

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| P023 | 107-20-0 | Acetaldehyde, chloro- |
| P002 | 591-08-2 | Acetamide, N-(aminothioxomethyl)- |
| P057 | 640-19-7 | Acetamide, 2-fluoro- |
| P058 | 62-74-8 | Acetic acid, fluoro-, sodium salt |
| P066 | 16752-77-5 | Acetimidic acid, N-[(methylcarbamoyl)oxy] thio-, methyl ester |
| P002 | 591-08-2 | 1-Acetyl-2-thiourea |
| P009 | 131-74-8 | Ammonium picrate (R) |
| P119 | 7803-55-6 | Ammonium vanadate |
| P010 | 7778-39-4 | Arsenic acid |
| P012 | 1327-53-3 | Arsenic oxide $As_2$ |
| P011 | 1303-28-2 | Arsenic oxide $As_2O_5$ |
| P011 | 1303-28-2 | Arsenic pentoxide |
| P012 | 1327-53-3 | Arsenic trioxide |
| P038 | 692-42-2 | Arsine, diethyl- |
| P036 | 696-28-6 | Arsonous dichloride, phenyl- |
| P054 | 151-56-4 | Aziridine |
| P013 | 542-62-1 | Barium cyanide |
| P024 | 106-47-8 | Benzenamine, 4-chloro- |
| P077 | 100-01-6 | Benzenamine, 4-nitro- |
| P028 | 100-44-7 | Benzene, (chloromethyl)- |
| P042 | 51-43-4 | 1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]-, (R) |
| P046 | 122-09-8 | Benzeneethanamine, alpha,alpha-dimethyl- |
| P014 | 108-98-5 | Benzenethiol |
| P001 | [1]81-81-2 | 2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, and salts |
| P028 | 100-44-7 | Benzyl chloride |
| P015 | 7440-41-7 | Beryllium dust |
| P016 | 542-88-1 | Bis(chloromethyl) ether |
| P017 | 598-31-2 | Bromoacetone |
| P018 | 357-57-3 | Brucine |
| P021 | 592-01-8 | Calcium cyanide |
| P022 | 75-15-0 | Carbon bisulfide |
| P022 | 75-15-0 | Carbon disulfide |
| P095 | 75-44-5 | Carbonic dichloride |
| P023 | 107-20-0 | Chloroacetaldehyde |
| P024 | 106-47-8 | p-Chloroaniline |
| P029 | 544-92-3 | Copper cyanide |
| P030 | —— | Cyanides (soluble cyanide salts), not otherwise specified |
| P031 | 460-19-5 | Cyanogen |
| P033 | 506-77-4 | Cyanogen chloride |
| P034 | 131-89-5 | 2-Cyclohexyl-4,6-dinitrophenol |
| P036 | 696-28-6 | Dichlorophenylarsine |
| P037 | 60-57-1 | Dieldrin |
| P038 | 692-42-2 | Diethylarsine |
| P041 | 311-45-5 | Diethyl-p-nitrophenyl phosphate |
| P040 | 297-97-2 | O,O-Diethyl O-pyrazinyl phosphorothioate |
| P043 | 55-91-4 | Diisopropyl fluorophosphate (DFP) |
| P004 | 309-00-2 | 1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5alpha, 8alpha,8abeta)- |

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| P003 | 107-02-8 | Acrolein |
| P070 | 116-06-3 | Aldicarb |
| P004 | 309-00-2 | Aldrin |
| P005 | 107-18-6 | Allyl alcohol |
| P006 | 20859-73-8 | Aluminum phosphide (R,T) |
| P007 | 2763-96-4 | 5-(Aminomethyl)-3-isoxazolol |
| P008 | 504-24-5 | 4-alpha-Aminopyridine |
| P046 | 122-09-8 | alpha, alpha-Dimethylphenethylamine |
| P047 | [1]534-52-1 | 4,6-Dinitro-o-cresol and salts |
| P048 | 51-28-5 | 2,4-Dinitrophenol |
| P020 | 88-85-7 | Dinoseb |
| P085 | 152-16-9 | Diphosphoramide, octamethyl- |
| P039 | 298-04-4 | Disulfoton |
| P049 | 541-53-7 | 2,4-Dithiobiuret |
| P050 | 115-29-7 | Endosulfan |
| P088 | 145-73-3 | Endothal |
| P051 | 72-20-8 | Endrin |
| P042 | 51-43-4 | Epinephrine |
| P101 | 107-12-0 | Ethyl cyanide |
| P054 | 151-56-4 | Ethyleneimine |
| P097 | 52-85-7 | Famphur |
| P056 | 7782-41-4 | Fluorine |
| P057 | 640-19-7 | Fluoroacetamide |
| P058 | 62-74-8 | Fluoroacetic acid, sodium salt |
| P065 | 628-86-4 | Fulminic acid, mercury(2+)salt (R,T) |
| P059 | 76-44-8 | Heptachlor |
| P062 | 757-58-4 | Hexaethyltetraphosphate |
| P116 | 79-19-6 | Hydrazinecarbothioamide |
| P068 | 60-34-4 | Hydrazine, methyl- |
| P063 | 74-90-8 | Hydrocyanic acid |
| P063 | 74-90-8 | Hydrogen cyanide |
| P096 | 7803-51-2 | Hydrogen phosphide |
| P064 | 624-83-9 | Isocyanic acid, methyl ester |
| P060 | 465-73-6 | Isodrin |
| P007 | 2763-96-4 | 3(2H)-Isoxazolone, 5-(aminomethyl)- |
| P092 | 62-38-4 | Mercury, (acetato-O)phenyl- |
| P065 | 628-86-4 | Mercury fulminate (R,T) |
| P082 | 62-75-9 | Methanamine, N-methyl-N-nitroso- |
| P016 | 542-88-1 | Methane, oxybis(chloro- |
| P112 | 509-14-8 | Methane, tetranitro- (R) |
| P118 | 75-70-7 | Methanethiol, trichloro- |
| P050 | 115-29-7 | 6,9-Methano-2,4,3-benzodioxathiepen, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide |
| P059 | 76-44-8 | 4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro- |
| P066 | 16752-77-5 | Methomyl |
| P067 | 75-55-8 | 2-Methylaziridine |
| P068 | 60-34-4 | Methyl hydrazine |
| P064 | 624-83-9 | Methyl isocyanate |
| P069 | 75-86-5 | 2-Methyllactonitrile |
| P071 | 298-00-0 | Methyl parathion |
| P072 | 86-88-4 | alpha-Naphthylthiourea |

Table A-1 (cont'd)

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| P060 | 465-73-6 | 1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5beta,8beta,8abeta)- |
| P037 | 60-57-1 | 2,7:3,6-Dimethanonaphth[2,3b]oxirane, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2aalpha,3beta,6beta,6aalpha,7beta,7aalpha)- |
| P051 | 72-20-8 | 2,7:3,6-Dimethanonaphth[2,3b]oxirane, octahydro-, (1aalpha,2beta,2abeta,3alpha,6alpha,6abeta,7beta,7aalpha)- |
| P044 | 60-51-5 | Dimethoate |
| P045 | 39196-18-4 | 3,3-Dimethyl-1-(methylthio)-2-butanone, O-[(methylamino)carbonyl] oxime |
| P085 | 152-16-9 | Octamethylpyrophosphoramide |
| P087 | 20816-12-0 | Osmium oxide |
| P087 | 20816-12-0 | Osmium tetroxide |
| P088 | 145-73-3 | 7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid |
| P089 | 56-38-2 | Parathion |
| P034 | 131-89-5 | Phenol, 2-cyclohexyl-4,6-dinitro- |
| P048 | 51-28-5 | Phenol, 2,4-dinitro- |
| P047 | [1]534-52-1 | Phenol, 2-methyl-4,6-dinitro- and salts |
| P020 | 88-85-7 | Phenol, 2-(1-methylpropyl)-4,6-dinitro- |
| P009 | 131-74-8 | Phenol, 2,4,6-trinitro-, ammonium salt (R) |
| P092 | 62-38-4 | Phenylmercury acetate |
| P093 | 103-85-5 | Phenylthiourea |
| P094 | 298-02-2 | Phorate |
| P095 | 75-44-5 | Phosgene |
| P096 | 7803-51-2 | Phosphine |
| P041 | 311-45-5 | Phosphoric acid, diethyl 4-nitrophenyl ester |
| P039 | 298-04-4 | Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester |
| P094 | 298-02-2 | Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl] ester |
| P044 | 60-51-5 | Phosphorodithioic acid, O,O-dimethyl S[2-(methylamino)-2-oxoethyl] ester |
| P043 | 55-91-4 | Phosphorofluoridic acid, bis(1-methylethyl) ester |
| P089 | 56-38-2 | Phosphorothioic acid, O,O-diethyl O-(p-nitrophenyl) ester |
| P040 | 297-97-2 | Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester |
| P097 | 52-85-7 | Phosphorothioic acid, O-[4-((dimethylamino)-sulfonyl)phenyl] O,O-dimethyl ester |
| P071 | 298-00-0 | Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester |
| P110 | 78-00-2 | Plumbane, tetraethyl- |
| P098 | 151-50-8 | Potassium cyanide |
| P099 | 506-61-6 | Potassium silver cyanide |
| P070 | 116-06-3 | Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime |
| P101 | 107-12-0 | Propanenitrile |
| P027 | 542-76-7 | Propanenitrile, 3-chloro- |
| P069 | 75-86-5 | Propanenitrile, 2-hydroxy-2-methyl- |
| P081 | 55-63-0 | 1,2,3-Propanetriol, trinitrate (R) |
| P017 | 598-31-2 | 2-Propanone, 1-bromo- |
| P102 | 107-19-7 | Propargyl alcohol |
| P003 | 107-02-8 | 2-Propenal |
| P073 | 13463-39-3 | Nickel carbonyl |
| P073 | 13463-39-3 | Nickel carbonyl, (T-4)- |
| P075 | [1]54-11-5 | Nicotine and salts |
| P076 | 10102-43-9 | Nitric oxide |
| P077 | 100-01-6 | p-Nitroaniline |
| P078 | 10102-44-0 | Nitrogen dioxide |
| P076 | 10102-43-9 | Nitrogen oxide NO |
| P078 | 10102-44-0 | Nitrogen oxide $NO_2$ |
| P081 | 55-63-0 | Nitroglycerine (R) |
| P082 | 62-75-9 | N-Nitrosodimethylamine |
| P084 | 4549-40-0 | N-Nitrosomethylvinylamine |
| P074 | 557-19-7 | Nickel cyanide |
| P005 | 107-18-6 | 2-Propen-1-ol |
| P067 | 75-55-8 | 1,2-Propylenimine |
| P102 | 591-08-2 | 2-Propyn-1-ol |
| P008 | 504-24-5 | Pyridinamine |
| P075 | [1]54-11-5 | Pyridine, (S)-3-(1-methyl-2-pyrrolidinyl)-, and salts |
| P111 | 107-49-3 | Pyrophosphoric acid, tetraethyl ester |
| P103 | 630-10-4 | Selenourea |
| P104 | 506-64-9 | Silver cyanide |
| P105 | 26628-22-8 | Sodium azide |
| P106 | 143-33-9 | Sodium cyanide |
| P107 | 1314-96-1 | Strontium sulfide |
| P108 | [1]57-24-9 | Strychnidin-10-one, and salts |
| P018 | 357-57-3 | Strychnidin-10-one, 2,3-dimethoxy- |
| P108 | [1]57-24-9 | Strychnine and salts |
| P115 | 10031-59-1 | Sulfuric acid, thallium(I) salt |
| P109 | 3689-24-5 | Tetraethyldithiopyrophosphate |
| P110 | 78-00-2 | Tetraethyl lead |
| P111 | 107-49-3 | Tetraethylpyrophosphate |
| P112 | 509-14-8 | Tetranitromethane (R) |
| P062 | 757-58-4 | Tetraphosphoric acid, hexaethyl ester |
| P113 | 1314-32-5 | Thallic oxide |
| P113 | 1314-32-5 | Thallium(III) oxide |
| P114 | 12039-52-0 | Thallium(I) selenide |
| P115 | 10031-59-1 | Thallium(I) sulfate |
| P109 | 3689-24-5 | Thiodiphosphoric acid, tetraethyl ester |
| P045 | 39196-18-4 | Thiofanox |
| P049 | 541-53-7 | Thioimidodicarbonic diamide |
| P014 | 108-98-5 | Thiophenol |
| P116 | 79-19-6 | Thiosemicarbazide |
| P026 | 5344-82-1 | Thiourea, (2-chlorophenyl)- |
| P072 | 86-88-4 | Thiourea, 1-naphthalenyl- |
| P093 | 103-85-5 | Thiourea, phenyl- |
| P123 | 8001-35-2 | Toxaphene |
| P118 | 75-70-7 | Trichloromethanethiol |
| P119 | 7803-55-6 | Vanadic acid, ammonium salt |
| P120 | 1314-62-1 | Vanadium(V) oxide |
| P084 | 4549-40-0 | Vinylamine, N-methyl-N-nitroso- |
| P001 | 81-81-2 | Warfarin |
| P121 | 557-21-1 | Zinc cyanide |
| P122 | 1314-84-7 | Zinc phosphide (R,T) |

[1]CAS Number given for parent compound only.

Table A-1 (cont'd)

| Industry and EPA hazardous waste No. | Hazardous waste | Hazard code |
|---|---|---|
| F020 | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of Hexachlorophene from highly purified 2,4,5-trichlorophenol.). | (H) |
| F021 | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives. | (H) |
| F022 | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra- , penta-, or hexachlorobenzenes under alkaline conditions. | (H) |
| F023 | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of Hexachlorophene from highly purified 2,4,5-trichlorophenol.). | (H) |
| F026 | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions. | (H) |
| F027 | Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing Hexachlorophene sythesized from prepurified 2,4,5-trichlorophenol as the sole component.). | (H) |

Table A-2

LIST OF TOXIC WASTES
Source: 40 CFR 261.33(f)

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| U001 | 75-07-0 | Acetaldehyde (I) |
| U034 | 75-87-6 | Acetaldehyde, trichloro- |
| U187 | 62-44-2 | Acetamide, N-(4-ethoxyphenyl)- |
| U005 | 53-96-3 | Acetamide, N-9H-fluoren-2-yl- |
| U112 | 141-78-6 | Acetic acid, ethyl ester (I) |
| U144 | 301-04-2 | Acetic acid, lead salt |
| U214 | 563-68-8 | Acetic acid, thallium (1+) salt |
| U232 | 93-76-5 | Acetic acid, (2,4,5,-trichlorophenoxy)- |
| U002 | 67-64-1 | Acetone (I) |
| U003 | 75-05-8 | Acetonitrile (I,T) |
| U004 | 98-86-2 | Acetophenone |
| U005 | 53-96-3 | 2-Acetylaminofluorene |
| U006 | 75-36-5 | Acetyl chloride (C,R,T) |
| U007 | 79-06-1 | Acrylamide |
| U008 | 79-10-7 | Acrylic acid(I) |
| U009 | 107-13-1 | Acrylonitrile |
| U011 | 61-82-5 | Amitrole |
| U012 | 62-53-3 | Aniline (I,T) |
| U014 | 492-80-8 | Auramine |
| U015 | 115-02-6 | Azaserine |
| U010 | 50-07-7 | Azirino(2',3':3,4)pyrrolo[1,2-a]indole-4,7-dione,6-amino-8-[((aminocarbonyl)oxy) methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl- |
| U157 | 50-49-5 | Benz[j]aceanthrylene, 1,2-dihydro-3-methyl- |
| U016 | 225-51-4 | 3,4-Benzacridine |
| U017 | 98-87-3 | Benzal chloride |
| U192 | 23950-58-5 | Benzamide, 3,5-dichloro-N-(1,1-diethyl-2-propynyl)- |
| U018 | 56-55-3 | Benz[a]anthracene |
| U094 | 57-97-6 | Benz[a]anthracene, 7,12-dimethyl- |
| U012 | 62-53-3 | Benzenamine (I,T) |
| U014 | 492-80-8 | Benzenamine, 4,4'-carbonimidoylbis[N,N-dimethyl- |
| U049 | 3165-93-3 | Benzenamine, 4-chloro-2-methyl- |
| U093 | 60-11-7 | Benzenamine, N,N-dimethyl-4-(phenylazo)- |
| U328 | 95-53-4 | Benzenamine, 2-methyl- |
| U353 | 106-49-0 | Benzenamine, 4-methyl- |
| U158 | 101-14-4 | Benzenamine, 4,4'-methylenebis[2-chloro- |
| U222 | 636-21-5 | Benzenamine, 2-methyl-, hydrochloride |
| U181 | 99-55-8 | Benzenamine, 2-methyl-5-nitro- |
| U019 | 71-43-2 | Benzene |
| U038 | 510-15-6 | Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy, ethyl ester |
| U030 | 101-55-3 | Benzene, 1-bromo-4-phenoxy- |
| U035 | 305-03-3 | Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]- |
| U037 | 108-90-7 | Benzene, chloro- |
| U221 | 25376-45-8 | Benzenediamine, ar-methyl- |
| U028 | 117-81-7 | 1,2-Benzenedicarboxylic acid, [bis(2-ethylhexyl)] ester |
| U069 | 84-74-2 | 1,2-Benzenedicarboxylic acid, dibutyl ester |
| U088 | 84-66-2 | 1,2-Benzenedicarboxylic acid, diethyl ester |
| U102 | 131-11-3 | 1,2-Benzenedicarboxylic acid, dimethyl ester |
| U107 | 117-84-0 | 1,2-Benzenedicarboxylic acid, di-n-octyl ester |

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| U070 | 95-50-1 | Benzene, 1,2-dichloro- |
| U071 | 541-73-1 | Benzene, 1,3-dichloro- |
| U072 | 106-46-7 | Benzene, 1,4-dichloro- |
| U060 | 72-54-8 | Benzene, 1,1'-(2,2-dichloro-ethylidene) bis[4-chloro- |
| U017 | 98-87-3 | Benzene, (dichloromethyl)- |
| U223 | 26471-62-5 | Benzene, 1,3-diisocyanatomethyl- (R,T) |
| U239 | 1330-20-7 | Benzene, dimethyl- (I,T) |
| U201 | 108-46-3 | 1,3-Benzenediol |
| U127 | 118-74-1 | Benzene, hexachloro- |
| U056 | 110-82-7 | Benzene, hexahydro- (I) |
| U220 | 108-88-3 | Benzene, methyl- |
| U105 | 121-14-2 | Benzene, 1-methyl-2,4-dinitro- |
| U106 | 606-20-2 | Benzene, 2-methyl-1,3-dinitro- |
| U055 | 98-82-8 | Benzene, (1-methylethyl)- (I) |
| U169 | 98-95-3 | Benzene, nitro- (I,T) |
| U183 | 608-93-5 | Benzene, pentachloro- |
| U185 | 82-68-8 | Benzene, pentachloronitro- |
| U020 | 98-09-9 | Benzenesulfonic acid chloride (C,R) |
| U020 | 98-09-9 | Benzenesulfonyl chloride (C,R) |
| U207 | 95-94-3 | Benzene, 1,2,4,5-tetrachloro- |
| U061 | 50-29-3 | Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-chloro- |
| U247 | 72-43-5 | Benzene, 1,1'-(2,2,2-trichloroethylidene)[4-methoxy- |
| U023 | 98-07-7 | Benzene, (trichloromethyl)- (C,R,T) |
| U234 | 99-35-4 | Benzene, 1,3,5-trinitro- (R,T) |
| U021 | 92-87-5 | Benzidine |
| U202 | [1]81-07-2 | 1,2-Benzisothiazol-3-(2H)-one,1,1-dioxide and salts |
| U203 | 94-59-7 | 1,3-Benzodioxole, 5-(2-propenyl)- |
| U141 | 120-58-1 | 1,3-Benzodioxole, 5-(1-propenyl)- |
| U090 | 94-58-6 | 1,3-Benzodioxole, 5-propyl- |
| U064 | 189-55-9 | Benzo[rst] pentaphene |
| U022 | 50-32-8 | Benzo[a]pyrene |
| U197 | 106-51-4 | p-Benzoquinone |
| U023 | 98-07-7 | Benzotrichloride (C,R,T) |
| U085 | 1464-53-5 | 2,2'-Bioxirane (I,T) |
| U021 | 92-87-5 | [1,1'-Biphenyl]-4,4'-diamine |
| U073 | 91-94-1 | [1,1'-Biphenyl]-4,4'-diamine, 3,3'-dichloro- |
| U091 | 119-90-4 | [1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethoxy- |
| U095 | 119-93-7 | [1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl- |
| U027 | 39638-32-9 | Bis(2-chloroisopropyl) ether |
| U024 | 111-91-1 | Bis(2-chloromethoxy) ethane |
| U028 | 117-81-7 | Bis(2-ethylhexyl) phthalate |
| U225 | 75-25-2 | Bromoform |
| U030 | 101-55-3 | 4-Bromophenyl phenyl ether |
| U128 | 87-68-3 | 1,3-Butadiene, 1,1,2,3,4,4-hexachloro- |
| U172 | 924-16-3 | 1-Butanamine, N-butyl-N-nitroso- |
| U031 | 71-36-3 | 1-Butanol (I) |
| U159 | 78-93-3 | 2-Butanone (I,T) |
| U160 | 1338-23-4 | 2-Butanone peroxide (R,T) |
| U053 | 4170-30-3 | 2-Butenal |
| U074 | 764-41-0 | 2-Butene, 1,4-dichloro- (I,T) |

Table A-2 (cont'd)

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| U143 | 303-34-4 | 2-Butenoic acid, 2-methyl-, 7-[(2,3-dihyr'roxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy)methyl]-2,3,5,7a-tetrahydro-1-pyrrolizin-[1]-yl ester, [1S-[1alpha(Z),7(2S,3R),7aalpha]]- |
| U031 | 71-36-3 | n-Butyl alchohol (I) |
| U136 | 75-60-5 | Cacodylic acid |
| U032 | 13765-19-0 | Calcium chromate |
| U238 | 51-79-6 | Carbamic acid, ethyl ester |
| U178 | 615-53-2 | Carbamic acid, methylnitroso-, ethyl ester |
| U097 | 79-44-7 | Carbamic chloride, dimethyl- |
| U114 | [1]111-54-6 | Carbamodithioic acid, 1,2-ethanediylbis-, salts and esters |
| U062 | 2303-16-4 | Carbamothioic acid, bis(1-methylethyl)-S-(2,3-dichloro-2-propenyl) ester |
| U215 | 6533-73-9 | Carbonic acid, dithallium(1+) salt |
| U033 | 353-50-4 | Carbonic difluoride |
| U156 | 79-22-1 | Carbonochloridic acid, methyl ester (I,T) |
| U033 | 353-50-4 | Carbon oxyfluoride (R,T) |
| U211 | 56-23-5 | Carbon tetrachloride |
| U034 | 75-87-6 | Chloral |
| U035 | 305-03-3 | Chlorambucil |
| U036 | 12789-03-6 | Chlordane |
| U026 | 494-03-1 | Chlornaphazine |
| U037 | 108-90-7 | Chlorobenzene |
| U039 | 59-50-7 | p-Chloro-m-cresol |
| U041 | 106-89-8 | 1-Chloro-2,3-epoxypropane |
| U042 | 110-75-8 | 2-Chloroethyl vinyl ether |
| U044 | 67-66-3 | Chloroform |
| U046 | 107-30-2 | Chloromethyl methyl ether |
| U047 | 91-58-7 | beta-Chloronaphthalene |
| U048 | 95-57-8 | o-Chlorophenol |
| U049 | 3165-93-3 | 4-Chloro-o-toluidine, hydrochloride |
| U032 | 13765-19-0 | Chromic acid, calcium salt |
| U050 | 218-01-9 | Chrysene |
| U051 | 8021-39-4 | Creosote |
| U052 | 1319-77-3 | Cresols (Cresylic acid) |
| U053 | 4170-30-3 | Crotonaldehyde |
| U055 | 98-82-8 | Cumene (I) |
| U246 | 506-68-3 | Cyanogen bromide |
| U197 | 106-51-4 | 2,5-Cyclohexadiene-1,4-dione |
| U056 | 110-82-7 | Cyclohexane (I) |
| U057 | 108-94-1 | Cyclohexanone (I) |
| U130 | 77-47-4 | 1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro- |
| U058 | 50-18-0 | Cyclophosphamide |
| U240 | [1]94-75-7 | 2,4-D, salts and esters |
| U059 | 20830-81-3 | Daunomycin |
| U060 | 72-54-8 | DDD |
| U061 | 50-29-3 | DDT |
| U062 | 2303-16-4 | Diallate |
| U063 | 53-70-3 | Dibenz[a,h]anthracene |
| U064 | 189-55-9 | Dibenzo[a,i]pyrene |
| U066 | 96-12-8 | 1,2-Dibromo-3-chloropropane |
| U069 | 84-74-2 | Dibutyl phthalate |
| U070 | 95-50-1 | o-Dichlorobenzene |
| U071 | 541-73-1 | m-Dichlorobenzene |
| U072 | 106-46-7 | p-Dichlorobenzene |
| U073 | 91-94-1 | 3,3'-Dichlorobenzidine |
| U074 | 764-41-0 | 1,4-Dichloro-2-butene (I,T) |

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| U075 | 75-71-8 | Dichlorodifluoromethane |
| U078 | 75-35-4 | 1,1-Dichloroethylene |
| U079 | 156-60-5 | 1,2-Dichloroethylene |
| U025 | 111-44-1 | Dichloroethyl ether |
| U081 | 120-83-2 | 2,4-Dichlorophenol |
| U082 | 87-65-0 | 2,6-Dichlorophenol |
| U240 | [1]94-75-7 | 2,4-Dichlorophenoxyacetic acid, salts and esters |
| U083 | 78-87-5 | 1,2-Dichloropropane |
| U084 | 542-75-6 | 1,3-Dichloropropene |
| U085 | 1464-53-5 | 1,2:3,4-Diepoxybutane (I,T) |
| U108 | 123-91-1 | 1,4-Diethyleneoxide |
| U086 | 1615-80-1 | N,N-Diethylhydrazine |
| U087 | 3288-58-2 | O,O-Diethyl-S-methyl-dithiophosphate |
| U088 | 84-66-2 | Diethyl phthalate |
| U089 | 56-53-1 | Diethylstilbestrol |
| U090 | 94-58-6 | Dihydrosafrole |
| U091 | 119-90-4 | 3,3'-Dimethoxybenzidine |
| U092 | 124-40-3 | Dimethylamine (I) |
| U093 | 60-11-7 | Dimethylaminoazobenzene |
| U094 | 57-97-6 | 7,12-Dimethylbenz[a]anthracene |
| U095 | 119-93-7 | 3,3'-Dimethylbenzidine |
| U096 | 80-15-9 | alpha,alpha-Dimethylbenzylhydroperoxide (R) |
| U097 | 79-44-7 | Dimethylcarbamoyl chloride |
| U098 | 57-14-7 | 1,1-Dimethylhydrazine |
| U099 | 540-73-8 | 1,2-Dimethylhydrazine |
| U101 | 105-67-9 | 2,4-Dimethylphenol |
| U102 | 131-11-3 | Dimethyl phthalate |
| U103 | 77-78-1 | Dimethyl sulfate |
| U105 | 121-14-2 | 2,4-Dinitrotoluene |
| U106 | 606-20-2 | 2,6-Dinitrotoluene |
| U107 | 117-84-0 | Di-n-octyl phthalate |
| U108 | 123-91-1 | 1,4-Dioxane |
| U109 | 122-66-7 | 1,2-Diphenylhydrazine |
| U110 | 142-84-7 | Dipropylamine (I) |
| U111 | 621-64-7 | Di-n-propylnitrosamine |
| U001 | 75-07-0 | Ethanal (I) |
| U174 | 55-18-5 | Ethanamine, N-ethyl-N-nitroso- |
| U155 | 91-80-5 | 1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)- |
| U067 | 106-93-4 | Ethane, 1,2-dibromo- |
| U076 | 75-34-3 | Ethane, 1,1-dichloro- |
| U077 | 107-06-2 | Ethane, 1,2-dichloro- |
| U131 | 67-72-1 | Ethane, hexachloro- |
| U024 | 111-91-1 | Ethane, 1,1'-[methylenebis(oxy)]bis[2-chloro- |
| U117 | 60-29-7 | Ethane, 1,1-oxybis- (I) |
| U025 | 111-44-4 | Ethane, 1,1'-oxybis[2-chloro- |
| U184 | 76-01-7 | Ethane, pentachloro- |
| U208 | 630-20-6 | Ethane, 1,1,1,2-tetrachloro- |
| U209 | 79-34-5 | Ethane, 1,1,2,2-tetrachloro- |
| U218 | 62-55-5 | Ethanethioamide |
| U227 | 110-80-5 | Ethanol, 2-ethoxy |
| U359 | 79-00-5 | Ethane, 1,1,2-trichloro- |
| U173 | 1116-54-7 | Ethanol, 2,2'-(nitrosoimino)bis- |
| U004 | 98-86-2 | Ethanone, 1-phenyl- |
| U043 | 75-01-4 | Ethene, chloro- |
| U042 | 110-75-8 | Ethene, (2-chloroethoxy)- |

Table A-2 (cont'd)

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| U166 | 130-15-4 | 1,4-Naphthoquinone |
| U167 | 134-32-7 | alpha-Naphthylamine |
| U168 | 91-59-8 | beta-Naphthylamine |
| U026 | 494-03-1 | 2-Naphthylamine, N,N'-bis(2-chloroethyl)- |
| U167 | 134-32-7 | 1-Naphthylenamine |
| U168 | 91-59-8 | 2-Naphthylenamine |
| U217 | 10102-45-1 | Nitric acid, thallium(1+) salt |
| U169 | 98-95-3 | Nitrobenzene (I,T) |
| U170 | 100-02-7 | p-Nitrophenol |
| U171 | 79-46-9 | 2-Nitropropane (I,T) |
| U172 | 924-16-3 | N-Nitrosodi-n-butylamine |
| U173 | 1116-54-7 | N-Nitrosodiethanolamine |
| U174 | 55-18-5 | N-Nitrosodiethylamine |
| U176 | 759-73-9 | N-Nitroso-N-ethylurea |
| U177 | 684-93-5 | N-Nitroso-N-methylurea |
| U178 | 615-53-2 | N-Nitroso-N-methylurethane |
| U179 | 100-75-4 | N-Nitrosopiperidine |
| U180 | 930-55-2 | N-Nitrosopyrrolidine |
| U181 | 99-55-8 | 5-Nitro-o-toluidine |
| U193 | 1120-71-4 | 1,2-Oxathiolane, 2,2-dioxide |
| U058 | 50-18-0 | 2H-1,3,2-Oxazaphosphorin-2-amine, N,N-bis(2-chloroethyl)tetrahydro-, 2-oxide |
| U115 | 75-21-8 | Oxirane (I,T) |
| U126 | 765-34-4 | Oxiranecarboxyaldehyde |
| U041 | 106-89-8 | Oxirane, (chloromethyl)- |
| U182 | 123-63-7 | Paraldehyde |
| U183 | 608-93-5 | Pentachlorobenzene |
| U184 | 76-01-7 | Pentachloroethane |
| U185 | 82-68-8 | Pentachloronitrobenzene (PCNB) |
| U242 | 87-86-5 | Pentachlorophenol |
| U186 | 504-60-9 | 1,3-Pentadiene (I) |
| U187 | 62-44-2 | Phenacetin |
| U188 | 108-95-2 | Phenol |
| U048 | 95-57-8 | Phenol, 2-chloro- |
| U039 | 59-50-7 | Phenol, 4-chloro-3-methyl- |
| U081 | 120-83-2 | Phenol, 2,4-dichloro- |
| U082 | 87-65-0 | Phenol, 2,6-dichloro- |
| U089 | 56-53-1 | Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-,(E)- |
| U101 | 105-67-9 | Phenol, 2,4-dimethyl- |
| U052 | 1319-77-3 | Phenol, methyl- |
| U132 | 70-30-4 | Phenol, 2,2'-methylenebis[3,4,6-trichloro- |
| U170 | 100-02-7 | Phenol, 4-nitro- |
| * U242 | 87-86-5 | Phenol, pentachloro- |
| * U212 | 58-90-2 | Phenol, 2,3,4,6-tetrachloro- |
| * U230 | 95-94-4 | Phenol, 2,4,5-trichloro- |
| U231 | 88-06-2 | Phenol, 2,4,6-trichloro- |
| U150 | 148-82-3 | L-Phenylalanine, 4-[bis(2-chloroethyl) amino]- |
| U145 | 7446-27-7 | Phosphoric acid, lead salt |
| U087 | 3288-58-2 | Phosphorodithioic acid, O,O-diethyl-, S-methyl ester |
| U189 | 108-95-2 | Phosphorus sulfide (R) |
| U190 | 85-44-9 | Phthalic anhydride |
| U191 | 109-06-8 | 2-Picoline |
| U179 | 100-75-4 | Piperidine, 1-nitroso- |
| U192 | 23950-58-5 | Pronamide |
| U194 | 107-10-8 | 1-Propanamine (I,T) |
| U111 | 621-64-7 | 1-Propanamine, N-nitroso-N-propyl- |
| U110 | 142-84-7 | 1-Propanamine, N-propyl- (I) |

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| U066 | 96-12-8 | Propane, 1,2-dibromo-3-chloro- |
| U149 | 109-77-3 | Propanedinitrile |
| U171 | 79-46-9 | Propane, 2-nitro- (I,T) |
| U027 | 39638-32-9 | Propane, 2,2'-oxybis[2-chloro- |
| U193 | 1120-71-4 | 1,3-Propane sultone |
| U235 | 126-72-7 | 1-Propanol, 2,3-dibromo-, phosphate (3:1) |
| U140 | 78-83-1 | 1-Propanol, 2-methyl- (I,T) |
| U002 | 67-64-1 | 2-Propanone (I) |
| U084 | 542-75-6 | 1-Propene, 1,3-dichloro- |
| U152 | 126-98-7 | 2-Propenenitrile, 2-methyl- (I,T) |
| U007 | 79-06-1 | 2-Propenamide |
| U243 | 1888-71-7 | 1-Propene, hexachloro- |
| U009 | 107-13-1 | 2-Propenenitrile |
| U008 | 79-10-7 | 2-Propenoic acid (I) |
| U113 | 140-88-5 | 2-Propenoic acid, ethyl ester (I) |
| U118 | 97-63-2 | 2-Propenoic acid, 2-methyl-, ethyl ester |
| U162 | 80-66-2 | 2-Propenoic acid, 2-methyl-, methyl ester (I,T) |
| *U233 | 93-72-1 | Propionic acid, 2-(2,4,5-trichlorophenoxy)- |
| U194 | 107-10-8 | n-Propylamine (I,T) |
| U083 | 78-87-5 | Propylene dichloride |
| U148 | 123-33-1 | 3,6-Pyridazinedione, 1,2-dihydro |
| U196 | 110-86-1 | Pyridine |
| U191 | 109-06-8 | Pyridine, 2-methyl- |
| U237 | 66-75-1 | 2,4(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]- |
| U164 | 56-04-2 | 4-(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo- |
| U180 | 930-55-2 | Pyrrolidine, 1-nitroso- |
| U200 | 50-55-5 | Reserpine |
| U201 | 108-46-3 | Resorcinol |
| U202 | 81-07-2 | Saccharin and salts |
| U203 | 94-59-7 | Safrole |
| U204 | 7783-00-8 | Selenious acid |
| U204 | 7783-00-8 | Selenium dioxide |
| U205 | 7446-34-6 | Selenium sulfide (R,T) |
| U015 | 115-02-6 | L-Serine, diazoacetate (ester) |
| * U233 | 93-72-1 | Silvex |
| U206 | 18883-66-4 | Streptozotocin |
| U103 | 77-78-1 | Sulfuric acid, dimethyl ester |
| U189 | 1314-80-3 | Sulfur phosphide (R) |
| *U232 | 93-76-5 | 2,4,5-T |
| U207 | 95-94-3 | 1,2,4,5-Tetrachlorobenzene |
| U208 | 630-20-6 | 1,1,1,2-Tetrachloroethane |
| U209 | 79-34-5 | 1,1,2,2-Tetrachloroethane |
| U210 | 127-18-4 | Tetrachloroethylene |
| * U212 | 58-90-2 | 2,3,4,6-Tetrachlorophenol |
| U213 | 109-99-9 | Tetrahydrofuran (I) |
| U214 | 15843-14-8 | Thallium(I) acetate |
| U215 | 6533-73-9 | Thallium(I) carbonate |
| U216 | 7791-12-0 | Thallium chloride |
| U217 | 10102-45-1 | Thallium(I) nitrate |
| U218 | 62-55-5 | Thioacetamide |
| U153 | 74-93-1 | Thiomethanol (I,T) |
| U244 | 137-26-8 | Thioperoxydicarbonic diamide, tetramethyl- |
| U219 | 62-56-6 | Thiourea |
| U244 | 137-26-8 | Thiuram |
| U220 | 108-88-3 | Toluene |
| U221 | 25376-45-8 | Toluenediamine |
| U223 | 26471-62-5 | Toluene diisocyanate (R,T) |

Table A-2 (cont'd)

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| U078 | 75-35-4 | Ethene, 1,1-dichloro- |
| U079 | 156-60-5 | Ethene, 1,2-dichloro-, (E)- |
| U210 | 127-18-4 | Ethene, tetrachloro- |
| U228 | 79-01-6 | Ethene, trichloro |
| U112 | 141-78-6 | Ethyl acetate (I) |
| U113 | 140-88-5 | Ethyl acrylate (I) |
| U238 | 51-79-6 | Ethyl carbamate |
| U038 | 510-15-6 | Ethyl 4,4'-dichlorobenzilate |
| U114 | 111-54-6 | Ethylenebis(dithiocarbamic acid), salts and esters |
| U067 | 106-93-4 | Etylene dibromide |
| U077 | 107-06-2 | Ethylene dichloride |
| U359 | 110-80-5 | Ethylene glycol monoethyl ether |
| U115 | 75-21-8 | Ethylene oxide (I,T) |
| U116 | 96-45-7 | Ethylene thiourea |
| U117 | 60-29-7 | Ethyl ether (I) |
| U076 | 75-34-3 | Ethylidene dichloride |
| U118 | 97-63-2 | Ethyl methacrylate |
| U119 | 62-50-0 | Ethylmethanesulfonate |
| U120 | 206-44-0 | Fluoranthene |
| U122 | 50-00-0 | Formaldehyde |
| U123 | 64-18-6 | Formic acid (C,T) |
| U124 | 110-00-9 | Furan (I) |
| U125 | 98-01-1 | 2-Furancarboxaldehyde (I) |
| U147 | 108-31-6 | 2,5-Furandione |
| U213 | 109-99-9 | Furan, tetrahydro- (I) |
| U125 | 98-01-1 | Furfural (I) |
| U124 | 110-00-9 | Furfuran (I) |
| U206 | 18883-66-4 | D-Glucopyranose, 2-deoxy-2(3-methyl-3-nitrosoureido)- |
| U126 | 765-34-4 | Glycidylaldehyde |
| U163 | 70-25-7 | Guanidine, N-methyl-N'-nitro-N-nitroso- |
| U127 | 18-74-1 | Hexachlorobenzene |
| U128 | 87-68-3 | Hexachlorobutadiene |
| U129 | 58-88-9 | Hexachlorocyclohexane (gamma isomer) |
| U130 | 77-47-4 | Hexachlorocyclopentadiene |
| U131 | 67-72-1 | Hexachloroethane |
| U132 | 70-30-4 | Hexachlorophene |
| U243 | 1888-71-7 | Hexachloropropene |
| U133 | 302-01-2 | Hydrazine (R,T) |
| U086 | 1615-80-1 | Hydrazine, 1,2-diethyl- |
| U098 | 57-14-7 | Hydrazine, 1,1-dimethyl- |
| U099 | 540-73-8 | Hydrazine, 1,2-dimethyl- |
| U109 | 122-66-7 | Hydrazine, 1,2-diphenyl- |
| U134 | 7664-39-3 | Hydrofluoric acid (C,T) |
| U134 | 7664-39-3 | Hydrogen fluoride (C,T) |
| U135 | 7783-06-4 | Hydrogen sulfide |
| U096 | 80-15-9 | Hydroperoxide, 1-methyl-1-phenylethyl- (R) |
| U136 | 75-60-5 | Hydroxydimethylarsine oxide |
| U116 | 96-45-7 | 2-Imidazolidinethione |
| U137 | 193-39-5 | Indeno(1,2,3-cd)pyrene |
| U139 | 9004-66-4 | Iron dextran |
| U190 | 85-44-9 | 1,3-Isobenzofurandione |
| U140 | 78-83-1 | Isobutyl alcohol (I,T) |
| U141 | 120-58-1 | Isosafrole |
| U142 | 143-50-0 | Kepone |
| U143 | 303-34-4 | Lasiocarpine |
| U144 | 301-04-2 | Lead acetate |
| U146 | 1335-32-6 | Lead, bis(acetato-O)tetrahydroxytri- |
| U145 | 7446-27-7 | Lead phosphate |
| U146 | 1335-32-6 | Lead subacetate |
| U129 | 58-89-9 | Lindane |
| U147 | 108-31-6 | Maleic anhydride |
| U148 | 123-33-1 | Maleic hydrazide |
| U149 | 109-77-3 | Malononitrile |
| U150 | 148-82-3 | Melphalan |
| U151 | 7439-97-6 | Mercury |
| U152 | 126-98-7 | Methacrylonitrile (I,T) |
| U092 | 124-40-3 | Methanamine, N-methyl- (I) |
| U029 | 74-83-9 | Methane, bromo- |
| U045 | 74-87-3 | Methane, chloro-(I,T) |
| U046 | 107-30-2 | Methane, chloromethoxy- |
| U068 | 74-95-3 | Methane, dibromo- |
| U080 | 75-09-2 | Methane, dichloro- |
| U075 | 75-71-8 | Methane, dichlorodifluoro- |
| U138 | 74-88-4 | Methane, iodo- |
| U119 | 62-50-0 | Methanesulfonic acid, ethyl ester |
| U211 | 56-23-5 | Methane, tetrachloro- |
| U153 | 74-93-1 | Methanethiol (I,T) |
| U225 | 75-25-2 | Methane, tribromo- |
| U044 | 67-66-3 | Methane, trichloro- |
| U121 | 75-69-4 | Methane, trichlorofluoro- |
| U123 | 64-18-6 | Methanoic acid (C,T) |
| U154 | 67-56-1 | Methanol (I) |
| U155 | 91-80-5 | Methapyrilene |
| U142 | 143-50-0 | 1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one,1,1a,3,3a,4,5,5,5a,5b,6-decachloro-octahydro- |
| U247 | 72-43-5 | Methoxychlor |
| U154 | 67-56-1 | Methyl alcohol (I) |
| U029 | 74-83-9 | Methyl bromide |
| U186 | 504-60-9 | 1-Methylbutadiene (I) |
| U045 | 74-87-3 | Methyl chloride (I,T) |
| U156 | 79-22-1 | Methylchlorocarbonate (I,T) |
| U226 | 71-55-6 | Methylchloroform |
| U157 | 56-49-5 | 3-Methylcholanthrene |
| U158 | 101-14-4 | 4,4'-Methylenebis(2-chloroaniline) |
| U068 | 74-95-3 | Methylene bromide |
| U080 | 75-09-2 | Methylene chloride |
| U159 | 78-93-3 | Methyl ethyl ketone (MEK)(I,T) |
| U160 | 1338-23-4 | Methyl ethyl ketone peroxide (R,T) |
| U138 | 74-88-4 | Methyl iodide |
| U161 | 108-10-1 | Methyl isobutyl ketone (I) |
| U162 | 80-62-6 | Methyl methacrylate (I,T) |
| U163 | 70-25-7 | N-Methyl-N'-nitro-N-nitrosoguanidine |
| U161 | 108-10-1 | 4-Methyl-2-pentanone (I) |
| U164 | 56-04-2 | Methylthiouracil |
| U010 | 50-07-7 | Mitomycin C |
| U059 | 20830-81-3 | 5,12-Naphthacenedione, (8S-cis)-8-acetyl-10-[(3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy- |
| U165 | 91-20-3 | Naphthalene |
| U047 | 91-58-7 | Naphthalene, 2-chloro- |
| U166 | 130-15-4 | 1,4-Naphthalenedione |
| U236 | 72-57-1 | 2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-dimethyl-(1,1'-biphenyl)-4,4'diyl)]-bis (azo) bis(5-amino-4-hydroxy)-, tetrasodium salt |

Table A-2 (cont'd)

| Hazardous waste No. | Chemical Abstracts No. | Substance |
|---|---|---|
| U328 | 95-53-4 | o-Toluidine |
| U353 | 106-49-0 | p-Toluidine |
| U222 | 636-21-5 | o-Toluidine hydrochloride |
| U011 | 61-82-5 | 1H-1,2,4-Triazol-3-amine |
| U226 | 71-55-6 | 1,1,1-Trichloroethane |
| U227 | 79-00-5 | 1,1,2-Trichloroethane |
| U228 | 79-01-6 | Trichloroethylene |
| U121 | 75-69-4 | Trichloromonofluoromethane |
| * U230 | 95-95-4 | 2,4,5-Trichlorophenol |
| * U231 | 88-06-2 | 2,4,6-Trichlorophenol |
| U234 | 99-35-4 | sym-Trinitrobenzene (R,T) |
| U182 | 123-63-7 | 1,3,5-Trioxane, 2,4,6-trimethyl- |
| U235 | 126-72-7 | Tris(2,3-dibromopropyl) phosphate |
| U236 | 72-57-1 | Trypan blue |
| U237 | 66-75-1 | Uracil mustard |
| U176 | 759-73-9 | Urea, N-ethyl-N-nitroso- |
| U177 | 684-93-5 | Urea, N-methyl-N-nitroso- |
| U043 | 75-01-4 | Vinyl chloride |
| U248 | 81-81-2 | Warfarin, when present at concentrations of 0.3% or less |
| U239 | 1330-20-7 | Xylene (I) |
| U200 | 50-55-5 | Yohimban-16-carboxylic acid, 11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl) oxy]-, methyl ester |
| U249 | 1314-84-7 | Zinc phosphide, when present at concentrations of 10% or less. |

[1]CAS Number given for parent compound only.

* These wastes are also designated as F027 wastes. See Table A-1.

Table A-2 (cont'd)

| Industry and EPA hazardous waste No. | Hazardous waste | Hazard code |
|---|---|---|
| Generic: F001 | The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | (T) |
| F002 | The following spent halogenated solvents: Tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | (T) |
| F003 | The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | (I)* |
| F004 | The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | (T) |
| F005 | The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | (I,T) |
| F006 | Wastewater treatment sludges from electroplating operations except from the following processes: (1) Sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum. | (T) |
| F019 | Wastewater treatment sludges from the chemical conversion coating of aluminum. | (T) |
| F007 | Spent cyanide plating bath solutions from electroplating operations. | (R, T) |
| F008 | Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process. | (R, T) |
| F009 | Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process. | (R, T) |
| F010 | Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process. | (R, T) |
| F011 | Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations. | (R, T) |
| F012 | Quenching waste water treatment sludges from metal heat treating operations where cyanides are used in the process. | (T) |
| F024 | Wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes from the production of chlorinated aliphatic hydrocarbons, having carbon content from one to five, utilizing free radical catalyzed processes. [This listing does not include light ends, spent filters and filter aids, spent desiccants, wastewater, wastewater treatment sludges, spent catalysts, and wastes listed in Section 261.32.]. | (T) |
| F028 | Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027. | (T) |

APPENDIX B

IDENTIFYING RCRA CHARACTERISTIC HAZARDOUS WASTES

EPA has identified four characteristics which cause a waste to be regulated as a hazardous waste: ignitable, corrosive, reactive, and extraction procedure (EP) toxic. For each characteristic, EPA has developed approved methods for determining whether a waste is hazardous. A brief description of each characteristic and applicable tests follows. The specific definitions of these characteristics are specified in 40 CFR 261, Subpart C.

CHARACTERISTIC OF IGNITABILITY:

A waste exhibits the characteristic of ignitability if a representative sample of the waste is easily combustible or flammable. Examples of these ignitable wastes include paint wastes, certain degreasers, and solvents. The specific characteristics of an ignitable waste include the following properties:

- o A liquid that has a flash point of less than 140°F as determined by a specific test method. This does not include aqueous solutions containing less than 24% alcohol by volume.
- o It is not a liquid but is capable of causing fire through friction, absorption of moisture, or spontaneous chemical changes under standard temperature and pressure conditions.
- o It is an ignitable compressed gas.
- o It is an oxidizer.

A waste exhibiting any of these characteristics of ignitablility is identified for regulatory purposes with an EPA hazardous waste number of D001.

CHARACTERISTIC OF CORROSIVITY

A waste exhibiting the characteristic of corrosivity will dissolve metal or burn the skin. Examples of corrosive wastes include waste rust removers, waste acids and alkaline solutions, and waste battery acids. The specific characteristics of a corrosive waste include the following:

- o An aqueous waste with a pH less than or equal to 2.0 or greater than or equal to 12.5 as determined by an EPA-approved method.

- o A liquid which corrodes steel at a rate greater than 6.35 millimeters (0.250 inches) per year at a temperature of 130°F as determined by specific test methods.

A waste exhibiting any of these characteristics of corrosivity is identified for regulatory purposes with an EPA hazardous waste number of D002.

CHARACTERISTIC OF REACTIVITY

A waste exhibiting the characteristic of reactivity is one that is unstable or undergoes rapid or violent chemical reactions with water or other material. Examples of reactive wastes include cyanide plating wastes, waste bleaches, and other waste oxidizers. The specific characteristics of a reactive waste include the following:

- o It is normally unstable and readily undergoes violent changes without detonating.
- o It reacts violently with water.
- o It forms a potentially explosive mixture with water.
- o It generates toxic gases, vapors, or fumes when mixed with water.
- o It is a cyanide or sulfide bearing waste which can generate toxic gases, vapors, or fumes when exposed to pH conditions between 2.0 and 12.5.
- o It is capable of detonation or a explosive reaction under standard temperature and pressure conditions or if subjected to a strong initiating source or if heated.

A waste exhibiting any of these reactive characteristics is identified for regulatory purposes with an EPA hazardous waste number of D003.

CHARACTERISTIC OF EP TOXICITY

EPA has designed a leaching test, called the Extraction Procedure (EP), to measure the amount of toxic materials that can be extracted from the waste under specific conditions. If the extract obtained from the test exceeds set concentration limits for certain constituents, the waste will be

considered hazardous. The EP toxicity test is used to determine whether leachate from disposal of a particular hazardous waste will pollute ground water.

There are 14 constituents that EPA has established concentration limits for in the EP toxicity test, including eight metals and six pesticides. Each of these contaminants has been assigned a specific EPA hazardous waste number. These contaminants, their associated EPA hazardous waste number, and the established concentration limits are listed in Table B-1. If a representative sample of a waste if found to contain any of the contaminants listed in this table at a concentration greater than or equal to those limits specified, the waste is considered an EP toxic hazardous waste.

# APPENDIX C: REFERENCES AND CONTACTS

## FEDERAL REGULATIONS

Code of Federal Regulations: The RCRA regulations addressed in this manual are referenced in the Code of Federal Regulations, Title 40, Parts 260 to 272.

Copies of the Code of Federal Regulations are available in most large public libraries. They may also be purchased from the Government Printing Office by calling (202) 783-3238.

RCRA Hotline: As a public service, the U.S. Environmental Protection Agency has provided a RCRA Hotline where anyone can call for technical or administrative information regarding the RCRA regulations.

The phone number for the RCRA Hotline is: 1-800-424-9346 (Hours from 8:30 a.m. to 4:30 p.m. EST, Monday through Friday)

References:


(1) "Understanding the Small Quantity Generator Rules: A Handbook for Small Business", published by EPA, Office of Solid Waste and Emergency Response, September, 1986. (EPA Publication No. EPA/530-SW-86-019) This is a handy, easy-to-read, reference for understanding the small quantity generator regulations.

(2) Handbook of Hazardous Waste Management for Small Quantity Generators, by Russell.W. Phifer and William .R McTigue, Jr., Lewis Publishers, Inc., 1988. This book provides a guide to the small quantity generator requirements, waste types generated from various industries, liability considerations, and onsite and offsite management of hazardous wastes.


## STATE REGULATIONS

Administrative Rules of Montana: The state regulations addressed in this manual can be found in the Administrative Rules of Montana, Rule 16, Chapter 44.

Montana Department of Health and Environmental Science (DHES): The DHES can provide assistance to anyone with questions or concerns about the federal and state regulations, compliance issues, or waste management practices.

For further information, contact the DHES, Solid and Hazardous Waste Bureau, Room B201, Cogswell Building, Helena, Montana, 59620. The phone number is: (406) 444-2821.